

A

NEW OPERATION

for Artificial Hip Joint,

IN

BONY ANCHYLOSIS.

ILLUSTRATED BY TWO CASES.

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OF NEW YORK.



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1863.

legs were flexed upon the thighs, and the thighs upon the pelvis, and have been immovably fixed in that position ever since. Had occasional pains all this time in both hips, but most severe in the right.

At the end of two years from date of attack, an abscess formed in left groin, which remained and discharged pus for two years. Abscesses also formed about the right hip; one beneath the gluteal muscle, and another near the anus. These discharged very freely and continued open for nearly a year and a half.

At the end of the first year, began to use crutches—compelled to use them ever since.

For the last six or eight years, general health has been perfectly good.

On admission he had ankylosis of both hips in the position seen in the annexed photographs.



FIG. 1.



FIG. 2.

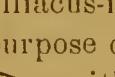
The left thigh was immovably fixed at nearly a right angle with the pelvis, by bony cementation of true ankylosis. The right was very firmly attached at an angle not quite so acute, and by a very careful examination I thought some slight motion could be detected which indicated that the attachments were fibrous in character, or at most were osteophytes only, and external to the joint, and that there was no agglutination between the femoral head and the acetabulum, whereas the opposite side seemed perfectly cemented together. He could not walk, except by whirling himself in semi-circles, first on one leg as a pivot, and then the other—or else by swinging himself on his crutches from the axilla. In order to get both feet upon the ground at the same time, his back was curved inward very much at the sacro-lumbar junction, the left knee flexed

at an angle of about 45 degrees with the thigh, and the right side of the pelvis was some inches higher than the left. He could only sit, by assuming a most awkward posture, half reclining on his side upon a couch or sofa ; and in laying down, was curled up either on one side or the other, or if upon his back, he had to be supported by pillows under his knees, and under the lumbar vertebrae. In fact, he was the most pitiable object I ever saw, and one that would excite the sympathy of any surgeon.

On the 4th of May I divided subcutaneously the adductor muscles, the rectus, tensor vagina femoris, and femoral fascia of the right hip, and breaking up the adhesions by some considerable force, obtained a very good motion of the joint. Extension was made to the limb by a weight and pulley, and the hip enveloped in cloths wet in cold water ; no serious trouble followed the operation, and in six weeks he could flex and extend, ab, and adduct his right limb with considerable freedom.

On the 11th of June, 1862, I removed a semicircular segment of bone above the trochanter minor of the left femur, for the purpose of establishing a new joint. Drs. I. P. Batchelder, Woodhull and Osborne of this city, Drs. Hooker of New Haven, Ct., Hichborne, of Mass., and Dr. James S. Green, of Elizabeth, N. J., were present at the operation.

As this is the first section of this kind ever made in this bone at the place indicated that I am aware of, I will give a brief description of the operation, and my reasons for performing it in the manner I did.

It is well known that Dr. Rhea Barton of Philadelphia, first operated for a deformity of this kind by making a ∇ section in the shaft of the bone and thus bringing the leg from that point down parallel with the other and obtaining ankylosis in an improved position. And the late Dr. J. Kearney Rodgers of this city repeated the operation in another case, only higher up in the shaft of the bone with equally good results. But my object was to go above the trochanter minor, so as to retain the insertion of the psoas magnus, and illiacus-internus muscles attached to the lower fragment, for the purpose of flexion, and by cutting out a *semicircular* piece thus  with its concavity downward, and then rounding off the upper end of the lower section I would more nearly imitate the natural joint, and give him a fair chance for motion at that point, with less danger of the parts slipping by each other when he walked, than there would be if I cut out a parallelogram, or a ∇ shaped piece.

The plan of the operation will be seen in the annexed figure No. 3.

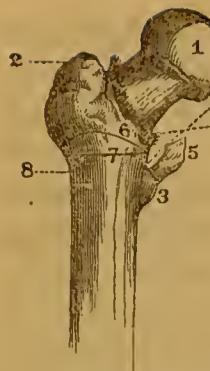


FIG. 3.

1, head of femur; 2, trochanter major; 3, trochanter minor; 4, line of insertion of capsular ligament (variable); 5, tendon of psoas mag and iliacus interus muscle; 6, line of curved section; 7, line of transverse section; 8, dotted lines indicating rounding off of lower fragment after removal of the segment.

The description of the operation, and notes of the case, are taken from the hospital records, which were kept by Dr. Shaw, house surgeon at that time, and at present in the U. S. Navy.

"An incision of about six inches was made over the trochanter major, in the axis of the limb. The cut was slightly lunate, with the concavity looking downwards. The lips were then separated, and the deeper structures, including the periosteum, were detached from the bone.

A curved instrument, armed with the chain saw, was passed around the bone between the trochanters, and the femur first sawn transversely across. A roof-shaped piece was then sawn out of the upper fragment.* The limb was then put upon moderate traction, longitudinal and lateral; the margins of the wound approximated by adhesive straps, and cold dressings applied.

June 15th. Wound begins to suppurate, and looks very well; no constitutional excitement.

16th. He has considerable pain in the limb, and has been unable to sleep. Relieved by increase of extension.

20th. Patient finds that pain is relieved sometimes by less extension.

July 4th. He has less pain; purulent discharge free.

Sept. 1st. Since last report patient has experienced no untoward symptoms; discharge from wound is now very slight. All extension is removed, and he begins to sit up. General condition very good, and has improved very much in flesh since admission.

Oct. 12th Since last report patient has been walking around the hospital on crutches, which had to be lengthened seven inches, as he is that much taller than he was before the operation, and is now quite straight, except the lateral curvature of the lower lumbar vertebræ, which raises one side of his pelvis more than the other and makes the right leg apparently shorter than the one from which the segment of bone was removed; but this is easily rectified by a higher heel on that side. He can sit down in a chair, and get up without assistance, except such as he obtains from his crutches. To-day he walked into the amphitheatre by the aid of his crutches, and exhibited himself to the class, and left the institution well, and with very good motion at both hip joints."

* In my second operation, see page 116, I sawed the curved section first, and should advise the operation to be performed in that way, for reasons which are there given.

About three weeks after he left the hospital, he was attacked with acute pain in the region of the wound, which became inflamed, and soon suppurated. In a few days a small semicircular piece of bone came away, and four days after, another similar piece; the two together making almost a ring, and seemed to be exfoliations from the lower fragment. All the pain immediately left him, and the wound healed in a very short time.

Mr. Anderson remained in the city until late in December, when he left, very unexpectedly, for Kentucky.

The night before he left he walked to my office, and could go up and down the steps without any difficulty; could stand on either leg without either crutch or cane; could take a step with either foot 27 inches, and when he supported his body on his crutches, could abduct his legs so that his heels were 36 inches apart. He could cross either leg over the other below the knee, without assistance, but could not cross them upon the thigh.

The following extract is from a letter of his dated the 20th January, 1863 :

" My leg is getting on famously, since I came to Kentucky. The first day after leaving New York I grew very tired, but continued night and day until we arrived at Cincinnati. I believe that when I got to Cincinnati I was fresher than when I started. We were in the city about half a day, and then came on to Lexington, stayed all night, and again resumed our journey. So far from being ex-

hausted at the end of the trip, I started next morning in a buggy and drove some twenty miles. I think if I had been compelled to travel a thousand miles before stopping, I could *almost* have danced a jig at the termination of the trip. But to speak seriously, I think I am doing very well indeed, and my leg gains strength continually."

Fig. 4 is engraved from a carte visité, which was received after the paper was sent to press, in a letter dated Spring Station, Woodford Co., Ky., April 11, 1863, in which letter he states : " I can now ' rough it ' a little without apprehension of having to suffer for it afterwards. I can bear my whole weight on my left leg without inconvenience, and can walk very well without other assistance than a walking stick, and the improvement is as great in a month now, as at any previous time."

NOTE.—With the exception of figures 1, 2, 5, 9, all the drawings were made by Gregory Doyle, medical student in my office, to whom I must express my obligations.



FIGURE 4.

CASE II. ANCHYLOSIS OF LEFT HIP, SECTION OF ELLIPTICAL SEGMENT OF FEMUR ABOVE TROCHANTER MINOR. RECOVERY, WITH FALSE JOINT AND GOOD MOTION.

Miss Susan M. Losee, of Buffalo, N. Y., aged 24, of healthy parents and of a robust and vigorous constitution, was attacked with pneumonia in March, 1856; attended by Dr. F. H. Hamilton. After three weeks went down stairs, contrary to the advice of her physician, and the following day was attacked with intense pain in the left hip and thigh, which was constant, persistent and most severe for several months. She did not fall or receive any injury that she was aware of, but it was supposed that she must have wrenched her hip in some way going down stairs, as she was very weak and went down without any assistance. During the first few weeks her leg was straight and could not be flexed, abducted or adducted without intense suffering. Bed sores by this time had become so extensive as to make it imperative to change her position, and in doing this, her limb was forcibly flexed at the knee and hip, but with the most intense pain; and when flexed in this position it could not be extended again without the greatest suffering, and was therefore permitted to remain in the flexed posture.

New sloughs appearing over the right trochanter, she was placed in a large chair and was not removed for two months, when sloughing occurred over the tuber ischii, and at the extremity of the coccyx, and she was again compelled to assume the horizontal position, and being forced to lie upon the right side, the left thigh was thrown over the right, in a flexed position, and thus became permanently and perfectly ankylosed, at the expiration of about seven months from the commencement of the disease.

No local application was made to the hip, but the pain and constitutional difficulty was combated principally by morphine, and no extension was applied to prevent the muscular contraction and

deformity. When she recovered, her left thigh was permanently flexed, at about forty degrees with the pelvis, and strongly adducted across the lower third of the right thigh, as seen in the accompanying drawings which were taken from life. Fig. 5 represents her standing. Fig. 6, in the act of walking.

In the erect posture, the heel of the left foot was ten and a half inches from the floor, and on the right side of the right leg. In attempting to walk, it was brought to



Fig. 5.



Fig. 6.

the floor, still on the right side of the opposite limb, or cross legged; and was made to reach the floor by a remarkable curvature forward of the lumbar portion of the spinal column; but walking was attended with great fatigue, and a peculiar dull pain in the lumbar region. Urination produced constant excoriation of the limbs, requiring great care and trouble in drawing a handkerchief or soft rag between the closely compressed thighs, to keep them clean or comfortable. Several efforts were made to insert a catheter, in order that the urine might be led off without irritating her limbs; but it was impossible to insert the finger so as to reach the orifice of the urethra, either from the anterior or posterior position, although every effort was made, and with great perseverance.

She remained in this condition until the 6th of November, 1862, seven years. She came to New York and placed herself under the care of Dr. C. F. Taylor, in the fall of 1861, who thought the ankylosis was simply fibrous, and capable of being relieved by passive movements. Dr. Van Buren saw her at this time, and diagnosticated the case as one of true bony ankylosis. I saw her in April, 1862, in consultation with Drs. Taylor, Peaslee and E. Lee Jones, and confirmed the diagnosis of Dr. Van Buren; but it was thought by all present that I might possibly break up the adhesions if I preceded the attempt by section of the tendons of the contracted muscles.

Accordingly, on the 10th of April, assisted by Drs. Peaslee, Taylor and Jones, I divided, subcutaneously, the adductors longus and magnus, the gracilis and pectineus, the rectus, sartorius and tensor vaginae femoris, and immediately closed the wounds with adhesive plaster, and applied a firm roller. No hemorrhage followed the operation. The pelvis was then firmly secured and every effort was made to give motion to the joint, that was consistent with safety or prudence, but without the slightest benefit whatever, and we were all satisfied that an entire section of the bone by the saw, was the only way that the limb could be moved from its flexed and fixed position. The patient was under the full influence of chloroform, administered by Dr. Jones, and was entirely insensible during the whole operation. The wounds healed kindly in a few days, without suppuration, and she was then in exactly the same condition as she was previous to the operation. As the weather was getting warm, I determined to leave her until fall and then make a section of the bone above the trochanter minor, and give her a chance to form an artificial joint, similar to Anderson's case..

On the 6th Nov., 1862, assisted by Profs. Peaslee and Raphael, and in the presence of Dr. J. P. Batchelder and Mr. Donne, medical

student, I performed the following operation: The patient having been put under the full influence of chloroform, a longitudinal incision six inches in length was made over the trochanter major, commencing just above its crest, and as near as possible to its centre, and carried directly down to the bone. About the centre of the incision I made another at right angles to it, in the posterior flap, but only carried it through the tegumentary and adipose tissue and the femoral fascia. The blade of the knife was then laid aside and with its handle and an elevator something like an ordinary oyster knife, I carefully peeled off the attachments from the bone, on its anterior surface, until my forefinger could reach the trochanter minor in front. The same thing was then done on the posterior surface of the bone, and the two fingers could then surround the bone, with the exception of a thin, firm fascia, between them on the front. This was readily pierced by a steel sound, curved to fit the femur, at this part, and a chain saw was then drawn through above the trochanter minor, which could be distinctly felt and was my guide.

About half an inch above it I commenced to saw, and carrying it first *upward* and outward, then outward, and then *downward* and outward, I made a curved section with its concavity downward, thus .* The saw was again passed around the bone, as at first, and inserted about an eighth of an inch below the first section and the bone sawed square off, at right angles with the long diameter of the bone. The segment thus removed was one-eighth of an inch in front or internal margin, three-fourths at its middle, and nearly half an inch at its external margin, as seen in Fig. 7.

The bone was very dense in texture, almost eburnated, as seen in Fig. 8, which represents the lower section.



FIG. 7.



FIG. 8. View of lower surface.

There was not more than two oz. of blood lost in the operation, and no ligature was necessary.

* It will be seen that in this case I reversed the order of the section of the bone from what I did in Anderson's case, and made the *curved* section *first*, and I should advise the operation to be performed in this way, as it is much easier and you are more certain to make your saw enter at the part desired when the shaft is complete, besides having the limb to keep the parts steady while the section is made. And as it requires some little delicacy of manipulation to carry a chain saw in this position in the curve required, it is well not to add to the complication by having a movable bone.

It may be asked, why not make both sections curved? Because it is so difficult to do it with accuracy, when one end of the bone is movable, and as the rounding off of the lower section is more simple and equally satisfactory, I prefer it.

The wound was brought together by two sutures and adhesive plaster, except the posterior incision, which was kept open by a tent of oakum. Adhesive plaster was applied below the knee, for the purpose of making extension, and a roller applied tolerably firm, from the toes up, over the entire limb, and around the pelvis.

She was then put in bed, the foot of which was raised some twelve inches higher than the head, and a pulley applied, over which a weight was attached by a cord to the adhesive plaster, for extension, the same as in a case of fracture of the thigh. Lateral extension was also applied to the upper portion of the thigh, to keep the upper end of the femur from crowding against the femoral vessels, by means of a broad band passed around the thigh and a cord attached to its outer aspect, which played through a pulley fixed in an upright by the side of the bed, just below the pelvis, and a weight attached. By this means the limb was brought in its natural position, parallel with the other and apparently of the same length. Ten drops of morphine were given, with instructions to repeat if necessary.

The following record of the case is an abstract from my note book :

17th Nov. Has had a very comfortable night; urinated without scalding her limbs, for the first time in seven years. No hemorrhage, or much heat of limb; pulse 94; complains of pain in the back, otherwise perfectly well.

11 P. M. Pain in the back very severe, just at the lower lumbar vertebræ, which is carried very much forward, and can only be relieved by being well bolstered up, and by raising the head and shoulders almost to the sitting posture.

18th. Slept well all night, with only 60 drops of Majendie's solution; pulse 94, and only complains of her back, which requires to be pressed frequently and quite firmly to make her comfortable; as it was difficult to use a bed-pan, and without it the urine soiled the bed and excoriated her person, I drew it by the catheter, which can now be inserted without the least difficulty.

19th. Wound commencing to suppurate, at the tent, the rest of the wound united by first intention; removed the sutures without disturbing the adhesive plaster; pulse 94; bowels moved naturally, and with the exception of pain in the lower part of the back, feels well.

Dec. 1st. No particular change since last report; suppuration healthy and not profuse. The only complaint she makes is from her back, and the difficulty she has in using the bed-pan. I put her to-day upon Dr. Nelson's fracture bed, which is a triple inclined plane, with an opening for defecation, and it has made her very comfortable indeed—and the extension was accomplished by simply flexing the legs at the knee, over the inclined plane, as seen in Fig. 9.



FIGURE 9.

This fracture bed was first constructed by Dr. Robert Nelson, of this city, formerly of Canada, and for convenience and comfort, as well as fulfilling all the indications required, is the most perfect contrivance I have ever used, and I cannot speak too highly in its favor.*

From the time the patient was placed upon it until she entirely recovered, a period of nearly four months, she was perfectly comfortable—could be raised or depressed to any desired angle, as often as required, without inconvenience, which greatly added to her comfort, by the change of position. The wound healed entirely within four weeks, except a very small opening in the posterior cut, which was at the most dependent position, and from which a small discharge of pus escaped; this discharge gradually diminished and finally ceased about the 1st of March, four months after the operation. Two small pieces of bone escaped during this time the size of a pin's head. For some weeks before its stoppage the discharge consisted of only a few drops in a day, of a very peculiarly whitish-yellow semi-fluid, of the consistency of thick starch water, and upon examination proved to be nearly pure albumen.

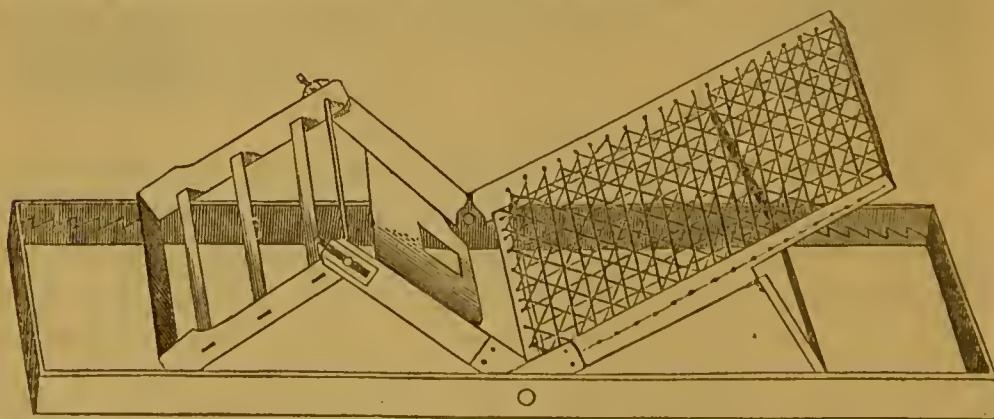


FIGURE 10. Dr. Nelson's fracture bed.

* In Hesselbach's *Handbuch der Chirurgischen*, printed in Jenna, 1845, will be found an almost exact duplicate of Nelson's bed on plate xxxix, with a description on page 1036, as having been constructed by Weckert; but as Dr. Nelson made his bed in 1820 we must give him the preference of priority.

After the first ten days from the operation I made slight movements of the limb very frequently, in order to prevent ankylosis, and this was also accomplished by the extension, which kept the severed bones from coming in contact with each other, and thus prevented osseous adhesion.

I gradually increased the extent of these motions, until, about the first of February, I could flex and extend, rotate, adduct and abduct the limb with almost the freedom of a natural joint, and could also press the bones together with considerable force without pain.

On the 8th of February, 1863, she got out of bed for the first time—the limbs are perfectly symmetrical and parallel—the left nearly three-quarters of an inch shorter than the right, when her weight is put upon it; but when she stands erect upon the other limb, it falls down, and is nearly if not quite as long as its fellow. By pressing it up you can shorten it a full half inch, and by concussion it gives a smooth, cushioned feel to the hands, without any crepitus or pain to the patient.

July 20th. She begins to have some control over the movements of her limb by voluntary muscular contraction, and can bear nearly her whole weight upon it as seen in figure 11.

The motions are nearly as perfect as those of the natural limb. From the perfect success attending the operation in these two cases of true ankylosis, and the freedom from all danger, as well as ease of its performance, I feel justified in recommending it to the profession as safe, and am satisfied that it will become established as one of the proper operations in surgery.



FIG. 11.

SEQUEL.

The patient progressed rapidly and favorably during several weeks, being able to bear her entire weight on the affected limb, with perfect freedom to passive motion, and gradual increase of control over the voluntary movements.

She was acquiring sufficient command over the limb to enable her, as the result of practice, to walk around her room, the exercise conducing to the improvement of her general health, as well as to the education and development of muscles which had long remained dormant; when, about the 1st of February, in opposition to my advice, she removed her flannels. She remained with them off for several days, and, on the 4th and 5th of February, being exposed for some hours to the intense cold then prevailing, she had a severe

chill, followed by great difficulty in breathing, pain in the chest, cough, &c., arising from congestion of the lungs.

She neglected to send for me at once, and when she did, I was out of town, and she refused other medical attendance. She grew worse rapidly, and when I saw her upon my return, I at once recognized her condition as one of extreme danger, and requested the presence of Dr. Flint in consultation.

We found the left lung had become almost hepatized, and for some days no respiration could be detected on that side. Under treatment resolution gradually took place, with the exception of an abscess in the upper lobe of the left lung, which Dr. Flint thought was the result of an apoplectic effusion. Dr. Flint did not at this time diagnosticate tubercles, but did at a later period.

To the pneumonia was superadded, in a short time, pleurisy of the left side. The urgent symptoms of the pneumonia were subdued, but the cough, which was very distressing, continued. There was no expectoration at any time.

Under a sustaining plan of treatment, with spirits of turpentine locally over the hepatized lung, she improved, and I was encouraged in the hope that the abscess might become sacculated, and remain circumscribed.

The weather, up to about the middle of April, had been too inclement to allow her the advantages of passive out-door exercise, which, together with nourishment, was now considered the principal treatment required.

During all this time the cough had remained of the same racking, distressing character, and without expectoration.

On the 20th of April, she complained of some pain in the vicinity of the cicatrix of the wound left by the operation, and the lower part of the wound became inflamed and puffed out, although it had been closed several weeks.

On the 22d, an abscess having formed, the wound opened, and a small curved piece of bone escaped, about one-eighth of an inch long, and of the thickness of an ordinary probe, quite rough and jagged.

The wound discharged a little bloody pus for a few days, after which it gradually merged into the same kind of oily fluid as had exuded during some months subsequent to the operation.

This, in a few more days, began to diminish, and gradually the wound again closed, leaving no tenderness upon pressure, or from motion of the new joint.

She could again bear her whole weight upon the limb without

inconvenience, and her command of its movements materially improved.

About the 1st of May she changed her residence, and for a number of days improved rapidly in strength and flesh, the principal annoyance being the cough.

On the 10th of May, having business out of town, I left the case in charge of Dr. Flint, who prescribed, for the cough, codeia, four grains, to simple syrup, four ounces, with directions to the nurse to give the patient a teaspoonful once in three hours while the patient remained awake, but to discontinue it while she slept.

During the night, as the result of larger and more frequently repeated doses of this mixture than had been ordered—which appeared from the admission of the nurse, and the small quantity left in the bottle—the patient had become thoroughly narcotized, and subsequently suffered for more than forty-eight hours, with most alarming symptoms of narcotic poisoning.

The utmost exertions on the part of Drs. Flint, Peaselee, and Wells, were required to sustain life, in consequence of the stomach rejecting stimulants, coffee, &c.

The cough had now entirely ceased, and never returned.

Great distress in the lungs was complained of, and partially relieved by counter-irritants. The stomach continued so weak as not to retain even a teaspoonful of iced water.

On the 12th she had recovered from the severe symptoms, when a relapse occurred from the administration of another dose of the cordeia, in direct violation of orders that no more should be given, which it seems were misunderstood by the nurse. During the night the patient was violently delirious, her screams arousing and disturbing the household until morning, when Dr. Wells administered, by inhalation, a small quantity of chloroform, which at once calmed the patient, and she slept for several hours.

I returned on the 13th, and found her still in a wild and distracted state of mind, and excessively prostrated, the stomach not having retained anything for several days.

The process of nutrition was necessarily suspended, and the patient was dying in consequence.

The stomach had lost all tone as the result of protracted narcotizing, induced carelessly, but with humane intent, and she was now sustained by enema.

On the 14th she had rallied, and become quite cheerful, but had no recollection of the terrible ordeal through which she had passed. Later in the day, while I was sitting by her bed, she suddenly had two severe convulsions, during which her lower limbs were flexed

at a right angle, and strongly adducted, the left one requiring almost as much force to straighten as the right.

The nurse stated that the patient had had a similar fit during the preceding night, the limbs being fixed in the same manner for a long time, and that when the spasm passed off she voluntarily straightened her limbs.

On the 16th she sat up about an hour, and after getting back in bed, discovered that the wound had again opened and discharged a few drops of bloody serum.

She passed a remarkably good night, and on the following day felt so much better that she begged me to allow her to take a ride the next day.

I tried to persuade her that she was too weak, but she was quite importunate, and after I had left, in order to test her strength in view of the anticipated ride, she got out of bed, and sat up in a chair for two hours.

The exertion was too much, and she fainted.

I was hurriedly summoned, and found her cold and pulseless, except at the earotids. Pupils much dilated; jaws relaxed; respiration very feeble and slow; unable to swallow. Brandy was given in enema, but not retained.

She gradually recovered consciousness and ability to talk, which she did rationally, but grew weaker and weaker until about six, p. m., on the 17th, when she died from exhaustion.

POST MORTEM.

An examination of the body was made about thirty-six hours after death, in the presence of Profs. Bush, of Lexington, Ky.; Parker and Raphael, of New York; and Drs. Speneer, of Watertown; Batehelder, Dewees, Stone, Bernaehi, Elsburg, Wells, Swift, Doyle, and Peek, of New York.

The body was extremely emaciated; the left leg being parallel with the right, the foot lying in the natural position, and was found to be half an inch shorter, and admitted of free, passive motion in all directions without eripitation. Upon opening the thorax, adhesions were noticed of various portions of the pleura and lungs, and a large abscess in the anterior portion of the upper lobe of the left lung. Two quite small abscesses were found in the lower lobe of the right lung, but neither of them communicated with the bronchi.

There was infiltration of deposit throughout the substance of the upper lobe of the left lung, which, under the microscope, was determined by Dr. Dewees to be tuberculous.

Upon examination of the artificial joint, it was found to be provided with a complete capsular ligament, and the articulating surfaces were tipped with cartilage, and furnished with synovial membrane. (See Fig. 12.)

There was a very small spicula of bone, which had exfoliated from the lower section in the orifice of the external wound, and which would have escaped in a few days. Four other small fibrillæ of bone, about one-half inch in length, and the thickness of the lead of an ordinary pencil, were found attached at one of their extremities, by periosteum, to the margin of the new head of the femur; their three extremities were thrust into the tissue around the joint. They were easily pulled off, having nearly exfoliated, and doubtless would have come away as the other pieces had done, had the patient lived.

All the other parts of the head and the new acetabulum were smooth, and covered with cartilage.

The conjunction of the articulating surfaces was perfected by the formation of two round ligaments springing from the surface of the new acetabulum, and by their convergence at the same point of attachment to the new caput femoris formed a new ligamentum teres.

These converging portions of the ligament were fan-shaped, and united at the sulcus of the new head of the femur.

A portion of the ilium, together with the cotoyloid cavity, containing the articulating head of the lower section, covered with cartilage, was removed, and upon section through the original acetabulum and caput femoris, only a slight line of demarcation was discoverable, the whole joint being fused into one solid, bony mass. (See Fig. 13.)

As I have recently exsected a perfect artificial joint, in a case of ununited fracture, and which was examined by Prof. Austin Flint, jr., and found to possess all the characteristics of the natural joint, and as I have not been able to find an examination of this kind

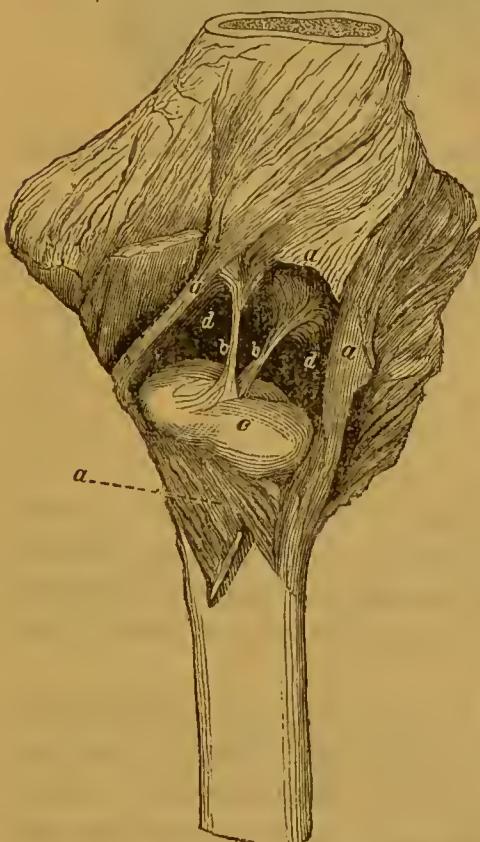


FIG. 12.—*a, a, a, a*, capsular ligament opened and reflected. *b, b*, round ligament with the cotoyloid cavity, containing imitation of ligamentum teres. *c*, articulating the ankylosed head of the lating head of lower section, covered with cartilage. *d, d*, new acetabulum, covered with cartilage; both lined with synovial membrane.

reordered, I publish it in connection with this paper, as it illustrates the manner in which nature effects a cure in these cases.

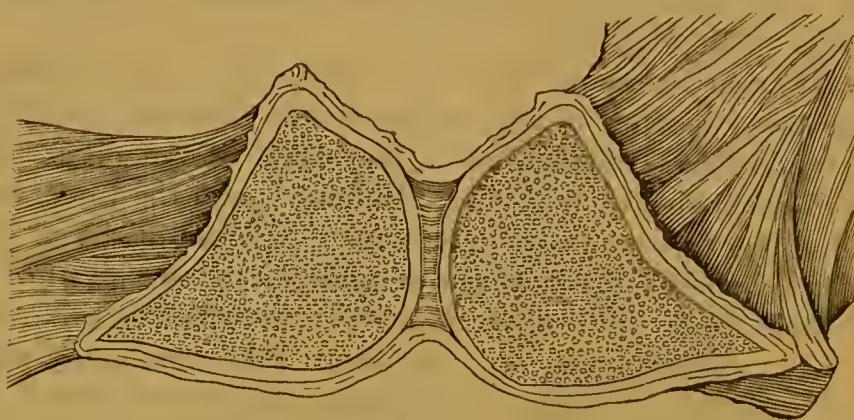


FIGURE 13.

EXSECTION OF UNUNITED ULNA—TRUE FALSE JOINT WITH CAPSULE AND CARTILAGE.

Mrs. G., aged 34, was admitted into the medical wards of Bellevue Hospital, in August, 1861, suffering from paralysis. In September she fell whilst attempting to get out of bed and fractured both bones of the forearm. She partially recovered from her paralysis, but the bones never reunited, and she was sent to the Island Hospital, and came under my charge in February, 1863, seventeen months after the accident.

She had so far recovered from the paralysis as to be able to walk tolerably well, and the upper extremities were as muscular and powerful as ever, but the right arm was entirely useless on account of the ununited fracture about the junction of the middle and upper third of the forearm.

On the 19th of February, 1863, I cut down upon the bones at this point, intending to saw off the ends of the ununited portions and obtain reunion by a readjustment of the bones, but when I came down to the point of fracture, I found it had been very oblique, and separated about a quarter of an inch, thus, and had become attached by a very firm ligamentous band, which admitted of quite a free gliding motion, without any crepitus whatever, and I decided to remove the entire portion, without severing the attachments of the artificial joint.

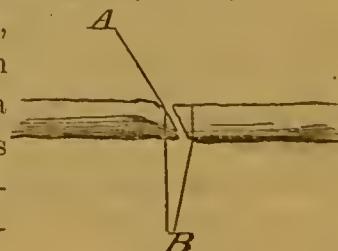


FIG. 14.

I therefore sawed out a portion half of an inch in length, which embraced the artificial joint and brought the bones fairly together and dressed with splints in the natural position, with the exception of the necessary shortening.

One of the sections passed through the new joint at A, thus giving an opportunity of examining its internal character and structure. B, shows the lines of the saw. The ligamentous attachment was more than one-eighth of an inch in length, very firm—tense and of a silvery shining whiteness. On looking at the open section, it had the smooth and oily appearance of a natural joint, and the motions of the bones upon each other were perfectly gliding without any friction or roughness.

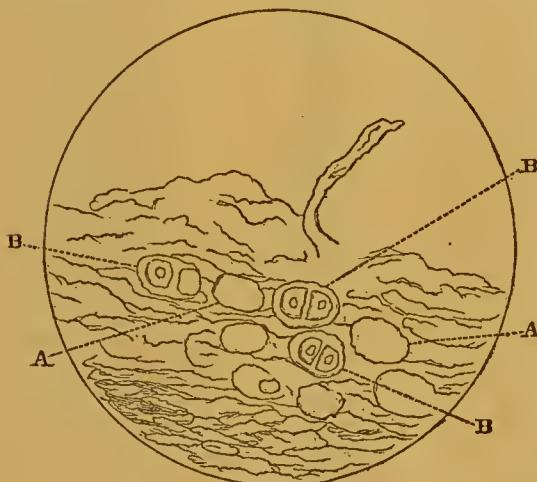


FIG. 15.—Cartilage, Cavities and Cells.

A, cart. cavities without cells; B, cartilage, cavities and cells.

Dr. Austin Flint, jr., examined the specimen by the microscope and reports that the lining is true cartilage, and it is therefore as perfect in all its physiological characters as any natural joint.

The annexed diagram shows the cartilage, cavities and cells, a taken by Dr. Flint under the microscope.

